to join the lake proper. Both the specimens of *Ophicephalus gachua* were heavily infested with *Argulus* all over the body on all sides and on the fins. The number of parasites collected from both the fishes was 26. The number of male specimens was 17 and the rest were females. On identification these parasites were found to be *Argulus indicus* Weber.

It would appear that *Argulus indicus* is not strictly host specific, but is ectoparasitic on different species of Indian murrels.

The author's thanks are due to Dr. B. S. Chauhan of the Zoological Survey of India for the specific identification of the parasites and for his helpful suggestions.

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26. PELAGIC SWARMING OF *POLYOPHTHALMUS* (FAMILY OPHELIIDAE—POLYCHAETA)[1]

(*With one text-figure*)

While making certain observations relating to the experimental *kelong*[2] fishing operations being conducted at this research station, I came across an interesting phenomenon which seems worthy of record. Surface collections made in the Gulf of Mannar (approximately at lat. 9° 16′ N. and long. 79° 08′ E.) during February and March 1958 with the help of a hand net after sunset under a 200 c.p. gas lamp suspended about half a metre above the water surface showed a varying number of small Opheliid worms on different nights. These

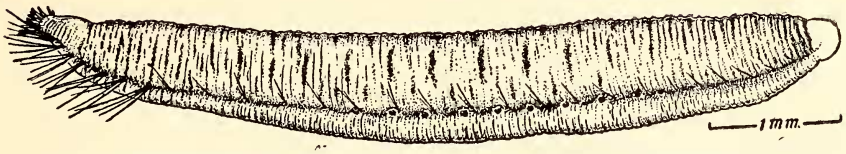
[1] Published with the permission of the Chief Research Officer, Central Marine Fisheries Research Station, Mandapam Camp.

[2] The 'Kelong' used in this case consists of a kind of lift net in conjunction with a light as lure and operated at night from a raised platform on the sea. Further descriptions of this will appear elsewhere. The author wishes to record here his appreciation of the help rendered by Shri D. Edward Chellappa who is conducting the fishing operations and who was responsible for obtaining the night collections.

collections were primarily intended for other purposes and, as no special effort was made to collect the polychaetes in particular, it is possible that at the time of collection these swift moving worms were present in larger numbers than were actually represented in the hauls. The phenomenon was observed at a distance of about 365 metres from the coast, where the bottom is characterised by loose sand and is surrounded by extensive coral and algal beds. During the highest tide the water is about 4 metres deep at this place, although during occasions when the swarming was noticed the water level had never attained its maximum for the night.

The Opheliid is identified as a juvenile *Polyophthalmus pictus* (Djuardin) and a slightly contracted specimen is shown in the figure. When freshly caught these worms swim about vigorously with a wriggling or more often a darting movement characteristic of many of the adult Opheliids. The length of the specimens ranges from 7 to 10 mm. with 27 setigerous segments. Body segmentation is not clearly marked off but there are annulations more numerous than the segments themselves. The body is pigmented by brown spots in the form of close rings which are prominent in the anterior and posterior regions. But this pattern is slightly variable with the pigment rings often losing their continuity and appearing in bands or patches in the middle and dorsal regions of the body. The head is not pigmented and the prostomium is short and round at its tip unlike many other Opheliids which show a pointed conical snout. The ventral groove is relatively more prominent than the ventrolateral ones. About 12 anal papillae are present fringing the margin of a short anal funnel. Lateral gills are absent throughout. 2 or 3 submerged cephalic eyes and about 10 lateral eye spots starting from the 7th segment are present. The parapodia in these specimens do not seem to have attained the adult biramous structure described for the genus and possess two or three simple capillary setae in each parapodium. However, in the last seven segments of the body the capillary bristles are highly elongated as shown in the figure with 5-7 setae in each foot. Those of the last segment project well beyond the anal papillae. Similar enlongated posterior bristles in the newly metamorphosed larvae have been noticed in *Ophelia* (Wilson, 1948) and in *Thoracophelia* (Dales, 1952). While discussing the significance of this character Wilson has also pointed out that this is a feature of the young and mature sexual individuals of *Polyophthalmus*. He has also noticed a slight correlation between the prolongation of these posterior bristles and the type of bottom soil inhabited by the worms, for the finer the soil the shorter are the posterior bristles. However, considering the pelagic swarming habit of these juvenile worms one

is inclined to regard this phenomenon as an adaptation for swimming during its pelagic phase.



Text-fig. A juvenile specimen of *Polyophthalmus pictus* (Djuardin).

The family Opheliidae includes worms with a markedly localised distribution inhabiting only a fairly narrow range in grade of bottom soil of the intertidal areas or at some depth in the sea. They are not known to have an atokous phase and do not usually occur in plankton when once they have taken to a life at the bottom after the metamorphosis of the larvae. There seem to exist only very few records of observations of these worms assuming a pelagic phase in their life besides the remarks by Fauvel (1927) and Wilson (1948) that *Polyophthalmus* becomes pelagic at night during its period of sexual maturity. Our knowledge of Indian Opheliidae itself is meagre. Fauvel's records (1956) show that Opheliid worms are known to occur from Ceylon, Pamban, Krusadai Island, and Kilakkarai in the Gulf of Mannar region. Recently I obtained adults of *Ammotrypane aulogaster* from the muddy bottom in the Mandapam Dockyard area and adjacent localities[1], and *Armandia* species from the sandy intertidal zones in Krusadai Island and also opposite the Fisheries Station Campus. With the occurrence of a varied and suitable type of substratum in these regions it is very likely that the different Opheliids inhabit other localities as well around the spot where the swarming phenomenon was noticed at present.

Apart from the classical examples of periodic swarming of the several errant polychaetes and their larvae which have been critically analysed and reviewed by Korringa (1947), the occurrence of sedentary forms such as the Scalibregmids in surface collections has been recorded by Clark (1952-53). Earlier, Meek and Storson (1924) have mentioned a pelagic phase in the life of the bottom living *Arenicola marina*. Korringa's review indicates that the swarming phenomenon exhibited by most such polychaetes more or less during definite periods is associated with maturity and changes in the lunar cycle. The worms taking part in the swarming have thus been found to be

[1] Thanks are due to Dr. R. Raghu Prasad for placing the bottom samples from the Gulf of Mannar at the disposal of the author in this connection.

sexually ripe. The few observations made at present do not warrant any generalisation of the factors influencing the rising of *Polyophthalmus* to the surface at night. Sexual play may have to be ruled out in this particular instance as the specimens obtained were all immature. The migrating Scalibremids observed by Clark (1952-53) were also immature as in this case. The period of sexual maturity of Opheliids in our waters is not known except for my observations on *Armandia Leptocirris* (unpublished) which become sexually ripe in February-March. The intervals of the swarming behaviour observed so far do not throw light on any possible correlation with the lunar phase although it may be mentioned that the worms appeared in surface collections between the full moon and the last quarter, on the new moon night, and again just before the first quarter with a maximum during that time. Similarly, factors such as the surface temperature and the weather conditions did not reveal any abnormal changes from the usual conditions prevailing in the Gulf during the season. The swarming of these worms under the light seems to indicate some kind of photopositive reaction although there is no conclusive evidence of this. However, this might be of some interest in view of the negative phototropism observed in the larvae of *Ophelia bicornis* by Wilson (1948). As regards the association of these swarming worms with other animals, the general composition of the organisms in each collection varied, sometimes considerably. Swarms of Calanoids, Cumaceans, Decapod larvae, or Ostracods were obtained along with the polychaetes on different nights.

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